

# **Department of Conservation**

## **Division of Oil, Gas, and Geothermal Resources**

### **Underground Injection Control Program Review Plan**

#### **Introduction**

Oil and gas production in California is a \$34 billion annual industry, employing more than 25,000 people with an annual payroll of over \$1.5 billion. California is the third largest oil-producing State in the nation, producing about 600,000 barrels per day. Property and other tax payments to the State and local governments from the industry amount to about \$800 million annually. There are approximately 90,000 active or idle production and injection wells in the state.

Injection wells have been an integral part of California's oil and gas operations for over 50 years. Currently, over 50,000 oilfield injection wells are operating in the state. Injection wells are used to increase oil recovery and to safely dispose of waste fluid produced with oil and natural gas. About 75 percent of California's oil production is the result of Enhanced Oil Recovery (EOR) methods such as steam flood, cyclic steam, water flood, and natural gas injection.

Most of the oil and gas fields in the state are quite mature, many in the waning stages of their productive cycle, and require EOR techniques for continued development. Each year more responsibility rests with the Division of Oil, Gas, and Geothermal Resources (Division) Underground Injection Control (UIC) Program to deal with the enhanced oil recovery of the resource, including new methods and techniques developed by the industry to produce the oil and gas. The increased use of injection potentially creates additional health and safety risks, especially in fields with older wells. These risks include groundwater contamination, reservoir fluids leaking to the surface, and fires and blowouts caused by the migration of oil and gas. Urban encroachment on or around older oil and gas wells raises additional issues and concerns. As explained more fully below, the Division has begun the process of reviewing these wells and the attendant regulations as part of its mandate to protect public health and safety.

#### **UIC Review Strategy**

In 2010, the Division agreed to work with EPA to conduct an audit to ensure the Division's compliance with its obligations to properly administer its Class II injection program under the Division's Primacy application, the Memorandum of Agreement, and the Safe Drinking Water Act. The audit was completed, and the report and findings (Horsley Witten report) were provided to the Division in the summer of 2011. The report highlighted several areas of

concerns, and the EPA requested a plan to address the gaps identified. The Division responded in November 2012 and informed EPA that the Division would evaluate the findings and put forward rulemaking packages to create a more robust regulatory program to close the gaps identified in the audit. This process was to take place in 2013. However, with the passage of Senate Bill 4, regulating well-stimulation practices, and the extensive set of activities by the Division to meet legislated deadlines for emergency and permanent regulation development, many of the milestones for the review of the UIC program were delayed. With focus now returning to the UIC program review, the Division has tentatively scheduled a workshop in early February, 2015 to provide an opportunity for stakeholders to provide input on the overall plan for a comprehensive UIC program review and associated rulemaking processes and to organize a more systematic approach to applications for aquifer exemptions for aquifers that meet the necessary qualifications for exemption.

Despite the effort required to respond to SB 4, the Division was successful in obtaining additional qualified staff needed for a more robust implementation of the UIC program including the formation of a Monitoring and Compliance Unit to perform an internal audit of the Division's UIC activities. After several months of training, the unit was first employed to reduce the backlog of UIC project applications. In 2013, the unit began to perform a peer review of UIC activities. The scheduling of the review was designed to take into consideration the risks associated with injection, and therefore the first district selected to be evaluated was the Cypress office, covering the Los Angeles basin. The review has been completed, and the draft report is being developed. The review, covering roughly 70 UIC projects and involving approximately 1500 wells, will be completed in January of 2015.

### **UIC Program Review Scope**

The Class II UIC Program is complex, consisting of several components that have distinct attributes and therefore require focused sets of regulations, compliance approaches and review systematics. Given the rapid evolution of technologies and industry practices to extract more oil and gas from the State's mature fields, regulations developed even a decade ago may not fully address all of the issues created by what is now routine industry practice.

In addition to injection related to EOR (steam injection, water flood, water injection, waste-water disposal), topical areas of concern included in the UIC program review are:

- Well construction and cementing requirements
- Plugging and abandoning requirements
- Evaluation of the zone of endangering influence (ZEI)
- Requirements for fluid waste disposal
- Requirements for monitoring of zone pressure
- Annual project reviews
- Well monitoring requirements

- Inspections and compliance/enforcement practices and tools
- Idle-well planning and testing program
- Financial responsibility requirements
- Cyclic steam injection wells
- Production from Shallow Thermal Diatomite

## **Aquifer Exemptions**

How the industry manages, and the Division regulates, industry activities concerning ground water aquifers is a primary focus of the UIC review and of *highest priority*. There is urgency in resolving some long-standing practices that are not fully compliant with the Safe Drinking Water Act. The long-term drying of the Western US and the State's severe drought have increased the urgency for swift and orderly action on aquifer exemptions.

In May of 2012, the Division met with EPA to discuss the aquifer exemption process. EPA reported that their legal unit had evaluated the State's Primacy application, along with the signed Memorandum of Agreement (MOA), and asked for verification that injection was not occurring in non-exempted zones. The Division began a review of the location of injection activities compared to those zones approved by EPA listed in the MOA. This process took months due to the lack of an adequate data management system and a lack of well-developed QA/QC protocols for the data.

In addition to challenges with the data accuracy, the administrative record concerning which aquifers are, in fact, exempt is far from clear. Documents originating with both DOGGR and the US EPA contain conflicting language about whether US EPA actually denied exempt status to any aquifer for which the Division had sought an exemption in its Primacy Application. The conflicting nature of these records adds to the confusion as to which aquifers are exempt.

Among these conflicting documents is a May 17, 1985 letter from Frank Covington, US EPA's then-Director of the Water Management Division for Region IX that appears to confirm that USEPA did not deny any of the exemptions proposed by the Division in its primacy application. *What cannot be ignored is the reality that this letter and other documents from the 1980s set in motion a now-entrenched expectation regarding which aquifers were exempted by US EPA when primacy status was delegated to California in 1983.*

Initial results of the review currently underway determined that injection was occurring into zones that were unequivocally *not* exempt. The review continues, and a process has been developed to determine the wells with the highest risks associated with injection, and the steps to be taken to bring injection well permits into compliance with the primacy agreement with US EPA. This review has been developed as follows:

1. Waste disposal wells injecting into non-exempt aquifers, including those aquifers whose exemption is not subject to debate, as well as those that are subject to debate (aquifers

listed in the EPA letter, dated 1985)

2. Waste disposal wells that are not specifically identified as part of a UIC project. These wells have no data associated to the wells and therefore the water quality of injected fluid and the zone of injection are not known. The water quality of the zone water could be less than 3,000 mg/L total dissolved solids (TDS).
3. Waste disposal/enhanced oil recovery (EOR) wells that are outside of any exempted aquifers, as identified in the 1982 Primacy agreement, based upon the productive limits of the oil and gas fields.
4. Waste disposal/enhanced oil recovery (EOR) wells that are inside of any exempted aquifers, as identified in the 1982 Primacy agreement, based upon the productive limits of the oil and gas fields, but may be injecting into a zone not exempted in the Primacy agreement.

This review covers over 30,000 wells, more than 29,000 of which are cyclic steam wells in hydrocarbon zones. Review of categories 1 and 2 above have been completed. Review of categories 3 and 4 is expected to be complete in 2015. When completed, this review will serve to clarify records and improve data quality so that the full review of the UIC program can commence.

### **Path Forward – Aquifer Exemptions**

The Division has identified a path forward regarding the UIC regulations and with closing the gaps identified in both the EPA audit and the Division's own internal audit. However, the issue of aquifer exemptions requires a well-specified path. Although injection is occurring into zones that have not been exempted, the risks associated with the different categories list above are different. The Division, State Water Resources Control Board, and the Regional Water Quality Control Boards have been working together with the Division to evaluate the risks. As such, some injection wells have been ordered to cease injection, and the operators of these wells ordered to provide specific data so that the regulatory agencies can fully evaluate the threat these wells could potentially have had on any nearby water supply wells.

Following delineation and analysis of where injection is occurring in non-exempt aquifers, the Division will work closely with industry to obtain the necessary supporting documentation to justify aquifer exemptions. With these data, the Division will prepare and submit draft proposals for aquifer exemptions to the Regional Water Quality Control Boards for their concurrence. Once the State is satisfied with the proposed exemption, the Division will submit the aquifer exemption applications to the US EPA for approval.

Of special concern is the injection into zones with water quality of less than 3,000 mg/L total dissolved solids, in both hydrocarbon and non-hydrocarbon producing zones. The Division is analyzing the conditions, if any, under which continued injection into hydrocarbon producing zones with water quality of less than 3,000 mg/L total dissolved solids should be permitted.

### **Initial Steps**

To initiate the Path Forward, the Division will need to take the following steps in priority order:

1. Work with EPA to obtain clear requirements for aquifer exemptions, including guidance as to the geographic area to be covered by an application. (*Estimated timeline: 2 months*) Guidance should be available by January 1, 2015.
2. Delineate a clear process for industry to supply the required supporting data to justify an aquifer exemption application. (*Estimated timeline: 1 month*) Once the Division has a clear understanding of the requirements for the application, based upon recommendations from EPA, the Division will prepare its own guidance document to facilitate receiving appropriate information and data from the industry in order to prepare justifiable aquifer exemption applications. A guidance document should be available no later than February 1, 2015.
3. Educate the oil and gas industry as to process and data requirements for aquifer exemptions. (*Estimated timeline: 1 month*) Once the Division has prepared a guidance document, the Division will schedule several meetings with industry associations to discuss the process, data requirements, and state and federal mandates relating to aquifer exemptions. These meetings will be designed to provide the industry with the first look regarding the process to applying for, and receiving aquifer exemptions. These meeting should be completed by March 1, 2015.
4. Work with EPA, the State Water Resources Control Board, and the Regional Water Quality Control Boards to conduct public workshops to share with stakeholders the issues, concerns, and process to bring injection into compliance with state and federal laws. (*Estimated timeline: 1 month*) Once the Division has prepared a guidance document, the Division will schedule several workshops throughout the state to provide a forum with stakeholders to discuss the process, data requirements, and state and federal mandates relating to aquifer exemptions. These workshops are anticipated to be completed by June 1, 2015.

Although this timeline suggests that the Division may not be able to move forward with aquifer exemptions until after March 1, 2015, this is not necessarily the case. The Division has already been evaluating the data supplied by operators to prepare an aquifer exemption. However, the EPA has stated that they will not accept applications on a lease by lease basis, and that they require a larger grouping of areas to be exempted. If operators provide the necessary data prior to the Division completing a guidance document, the Division will evaluate the data and prepare the application to EPA, if appropriate. Operators will be informed that additional data may be required based upon discussions with the EPA, the State Water Resources Control Board, and the Regional Water Quality Control Boards.

### **Transitioning to a Fully Compliant Future**

A major issue in urgent need of resolution is the path forward for industry and DOGGR in terms of permits for future oil and gas activities during the period the issues noted above are being resolved.

There are approximately 250 UIC Class II wells, mostly for enhanced oil recovery, drilled annually. The circa 50 water disposal wells drilled annually affects directly the productivity of roughly 1500 producing wells. Of these, depending on the operator, between 20 and 70% of the wells are drilled into aquifers for which exemptions have been planned but not approved. Immediate cessation of permitting into these currently non-exempt aquifers would be an abrupt deviation from industry expectations in areas that would very likely qualify for exemptions. It would also have a very significant negative impact on industry's planning efforts and need to advance exploration activities to maintain the State's oil production. An important feature of DOGGR's permitting practices to date involve allowing activity to progress in aquifers with the necessary attributes to qualify for exemption.

In light of greatly heightened vigilance for the State's ground water resources and concern for future water needs of the State, additional UIC permits going forward must be mindful of statutory requirements as well as any potential risks to groundwater. UIC wells currently permitted into not yet exempted aquifers may not pose a risk to groundwater, though further investigation is needed for a more complete assessment. The proposed approach for permit applications review attempts to balance economic impact and appropriate evaluation of risk to groundwater resources.

#### *Classes of projects and considerations in granting permits*

Previous plans to grant drilling permits while application for aquifer exemptions were underway has faltered because of a lack of clarity noted above, in addition to an unclear timetable to which DOGGR must adhere. Within the next 24 months, no later than October, 2016, all oil and gas activities will be permitted within all appropriate regulations and guidelines. As noted above, this will require an active program to move briskly toward aquifer exemption applications with prompt decisions by EPA.

For each project application, the review and approval process will be based on each project's ability to demonstrate how it individually meets the requirements established for aquifer exemptions, with clear recognition that a well-defined zone within an aquifer might meet the requirements for exemption but the remaining portion of the aquifer might require protection. Necessary but not always sufficient requirements for this showing are:

- a. The aquifer does not currently serve as a source of drinking water.
- b. The aquifer does not now, nor will in the future, serve as a source of drinking water because:
  - i. It is mineral, hydrocarbon, or geothermal energy producing, or can be demonstrated by the permit applicant to contain minerals or hydrocarbons that considering their quality and location are expected to be commercially producible;
  - ii.

The aquifer is at a depth or location that renders recovery of water for drinking purposes economically or technically impractical; iii. The aquifer is contaminated so as to be technically or economically impractical to be rendered fit for human consumption; iv. The aquifer is located over a Class III well mining area subject to subsidence or catastrophic collapse.

- c. The total dissolved solids content of the aquifer is more than 3,000 and less than 10,000 mg/l and is not reasonably expected to supply a public water system.

#### *Project permit categories*

Treatment of project applications will depend on the nature of the project and characteristics of the target zone:

1. Water disposal wells into sub-3,000 TDS non-exempt aquifers. These applications will be permitted only if an aquifer exemption is in place. Aquifer exemptions for this class of aquifer require approval after public comment periods from EPA headquarters in Washington DC. One attribute that will be necessary is demonstration that the zone is or has strong potential to be hydrocarbon producing within the zone of interest. Otherwise owing to the quality of the water, the State Water Resources Board will not allow an aquifer exemption to proceed.
2. Water disposal wells into 3,000-10,000 TDS aquifers. These applications will be considered. Project applications for water disposal into aquifers with TDS levels close to but greater than 3000 TDS will likely receive heightened scrutiny in comparison to those for aquifers with TDS levels close to but below 10,000 TDS. In addition, the chemistry of the water to be injected will be considered in the context of the water quality in the aquifer.
3. Enhanced oil recovery into sub-3,000 TDS aquifers that also include hydrocarbons in the aquifer. Owing to concern for water of potential beneficial use, this class will require a detailed analysis of the aquifer, delineation of hydrocarbon zones, and which portions of the aquifer might be candidates for exemption.
4. Enhanced oil recovery into 3,000-10,000 TDS aquifers.

#### *New and Existing Projects*

The following categories provide requirements for the approval of new projects or the expansion of existing projects:

1. New projects – Aquifer exemptions must be granted before any injection wells can be permitted.
2. Existing projects in which no new injection wells will be drilled – Aquifer exemptions must be in place by October 2016.
3. Existing projects within which new injection well permits are requested – new drilling will be allowed to take place, but the aquifer exemption must be granted in accord with a compliance schedule leading to exemption approval prior to October 2016.

4. Existing groups of wells currently not associated with a project – Project application must be approved and the aquifer exemption approved by October 2016.
5. Existing groups of wells currently not associated with a project in which new injection wells are requested – new drilling will be allowed to take place, but the aquifer exemption must be granted in accord with a compliance schedule leading to exemption approval prior to October 2016.
6. Exploratory wells – these wells can be drilled in accordance with relevant Federal, State and local regulations and requirements, but new any injection wells will require a new project and an aquifer exemption to be in place before injection can be permitted.

## **Priorities for UIC Program Review**

### **Division Internal Review of UIC Practices**

The Division has developed and begun an internal assessment of the Division-wide UIC Program via the work of the Monitoring and Compliance Unit. In the development of the assessment, the Division has considered the following concerns to help guide priority activities:

- Risk to the public
- Risk to health and safety
- Risk to property
- Risk to natural resources
- Risk of litigation

The highest priority issues are being addressed first. Based upon known current conditions, injection projects located in the Cypress District (Division – District 1) have the highest priority. The district has 160 injection projects, which includes nearly 1,600 injection wells. A draft report on an internal assessment of the Cypress District is nearing completion.

The assessment is designed to evaluate the Division's UIC program with respect to the consistent adherence to UIC regulations. The UIC program standards that should be used are listed in both California's Primacy application and the federal regulations associated with the Safe Drinking Water Act and Class II injection wells. The assessment will:

- Evaluate a representative sampling of old projects that are in fields that were discovered in the 1930's and 1940's to determine if appropriate AORs were completed and to determine if possible conduits for the injection fluid are present.
- Evaluate a representative sampling of recent projects to determine if appropriate AORs were completed and to determine if possible conduits for injection fluid are present.
- Evaluate a representative sampling of the records for annual project reviews to determine if they were performed and documented adequately to determine if the project is in compliance with the project approval.
- Evaluate a representative sampling of the Division's UIC monitoring program to

determine if adequate Mechanical Integrity Testing (MIT) surveys are conducted, evaluated, and documented to ensure mechanical integrity of the injection wells.

- Evaluate a representative sampling of the Division's UIC monitoring program to determine if the Maximum Allowable Surface Pressures (MASP) are determined correctly and monitored to ensure compliance with the project approval.
- Evaluate if the Division's UIC staff are appropriately educated and trained and have the necessary tools to enforce the Safe Drinking Water Act with respect to Class II wells.
- Evaluate if the Division has enough staff and resources to adequately enforce the Safe Drinking Water Act in regards to Class II wells

To accomplish the assessment of the Division's UIC program, the Division has created a Monitoring and Compliance Unit to conduct a review of the program. The Division has experience with this model and has used this for a permitting review, and is currently using it to evaluate district UIC operations. The Review Team is assessing the following to ensure compliance:

- Injection project applications
- Project files
- Monitoring data
- Surveys
- Injections reports

In addition, site visits take place to evaluate the current program, staff, and business processes to ensure compliance with the Primacy application.

A draft report that lists the results of the assessment in our Cypress district office is nearing completion. In addition, the final report will include recommendations for improving the Division's UIC program, listing what steps should be taken to bring the program into compliance with the expectations of the US EPA and the Safe Drinking Water Act.

### **Regulation Development**

The Division has previously discussed drafting regulations to address those issues identified in the Horsley Witten audit, as well as those issues identified by the Legislature and the Division. These regulations may be quite extensive and will take some time to fully develop. In addition, most areas covered by these regulations will require considerable discussion with all stakeholders. Hence the Division is planning on conducting workshops to engage stakeholders.

The Division anticipates scheduling workshops to discuss regulations covering a range of topics, and selected industry efforts have already been undertaken to highlight some areas in which more refined regulations may be warranted. (For example in the past few years, the Conservation Committee of California Oil and Gas Producers has reviewed and made initial recommendations on new regulation of activities within shallow diatomite formations.) Active

participation in these workshops should include, and not be limited to the following: US EPA, State Water Board, Regional Water Quality Control Boards, Department of Toxic Substance Control, Air Resources Control Board, Western States Petroleum Association, California Independent Petroleum Association, Independent Oil Producers' Agency, Conservation Committee of California Oil and Gas Producers, County and City agencies, Non-Government Organizations, and the general public.

The discussion of priorities will be designed to have multiple, phased areas of focus, including areas of concern identified by the Horsley Witten audit, the Legislature, the regulated community, the public, and the Division itself. Once the priority lists are generated, the Division will move forward with publishing discussion documents and conducting limited workshops. Discussion drafts covering specific phases could be ready as soon as April 2015. After the discussion draft workshops are complete for each section, the Division will prepare draft regulations and begin the process to develop and vet new regulations.

### **Potential Areas for New and Modified Regulations**

- Well construction and cementing requirements
- Plugging and abandoning requirements
- Evaluation of the zone of endangering influence (ZEI)
- Requirements for fluid waste disposal
- Requirements for monitoring of zone pressure
- Annual project reviews
- Well monitoring requirements
- Inspections and compliance/enforcement practices and tools
- Idle-well planning and testing program
- Financial responsibility requirements
- Cyclic steam injection wells
- Production from Shallow Thermal Diatomite

We envision that a thorough review of the UIC program and the necessary attendant revision of existing regulations and the development of needed new regulatory measures will require a period of approximately three years. This effort will require additional Division staff to maintain focus on the review and developmental aspects of the program, including new aquifer exemptions, while at the same time Division staff focus on the application of current regulations, monitoring and compliance. The whole process will usher in a change in culture in which evolution of industry opportunities, economic realities, technological advances as well as State regulation of ground water resources will demand a process in which regulatory framework keeps pace and also engages a broader stakeholder community.

Review Schedule for calendar 2015:

2015 Q1

- UIC well review continues.
- Stakeholder workshops for aquifer exemptions.
- Initiate process for development of aquifer exemption package development.

#### 2015 Q2

- 2015 Q4 Complete UIC well review.
- Stakeholder workshops to discuss priorities for regulation development.
- Aquifer exemption packages prepared.

#### 2015 Q3

- Aquifer exemption package preparation and submission continues.
- Regulation development plan complete and initial draft regulations prepared.
- UIC wells not associated with a project are assigned to or developed as a project.

#### 2015 Q4

- Aquifer exemption package preparation and submission continues
- Regulation development begins with initial public review of draft regulations